PCT/KR2004/002630
RO/KR 17.11.2004

$$H = \begin{bmatrix} I & I & I & \cdots & I \\ I & \sigma^1 & \sigma^2 & \cdots & \sigma^{p-1} \\ I & \sigma^2 & \sigma^4 & \cdots & \sigma^{2(p-1)} \\ & & & & \\ I & \sigma^{r-1} & \sigma^{2(r-1)} & \cdots & \sigma^{(r-1)(p-1)} \end{bmatrix}$$

FIG.1

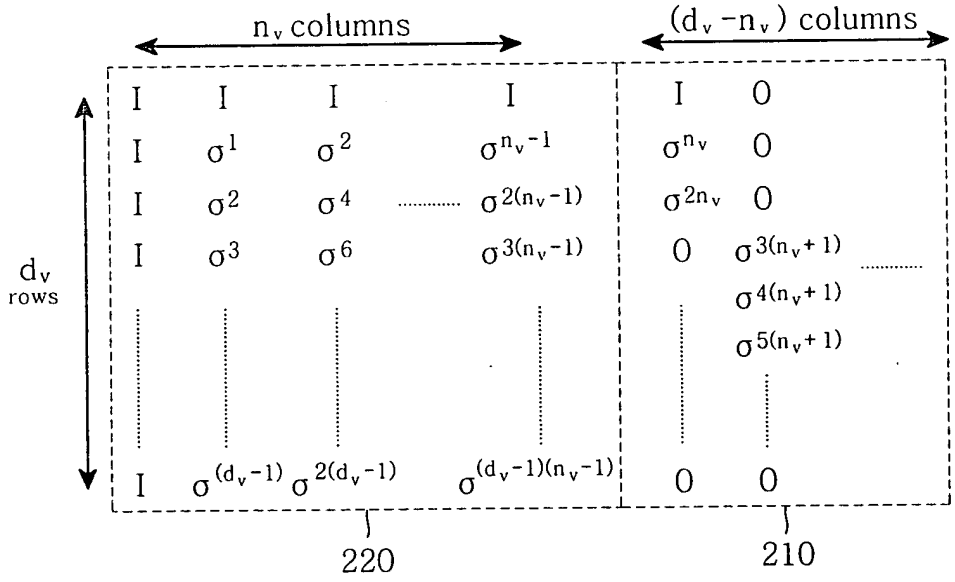


FIG.2

PCT/KR2004/002630
RO/KR 17.11.2004

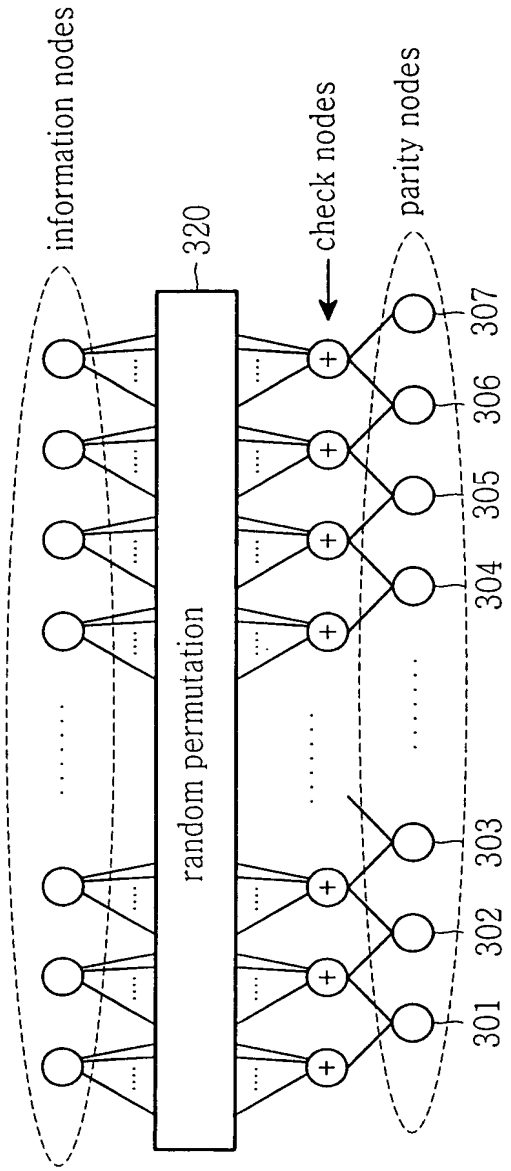


FIG.3

PCT/KR2004/002630
RO/KR 17.11.2004

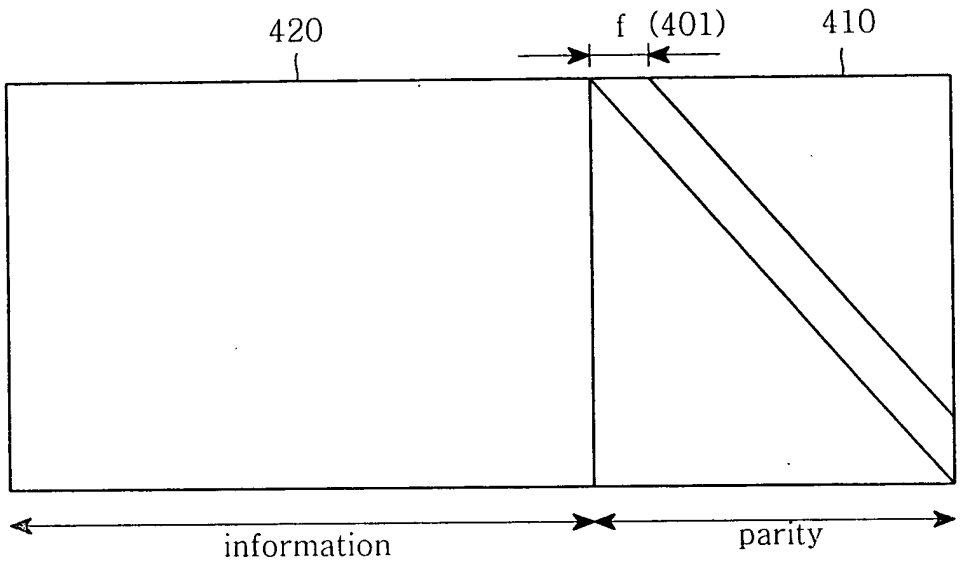


FIG.4

PCT/KR2004/002630
RO/KR 17.11.2004

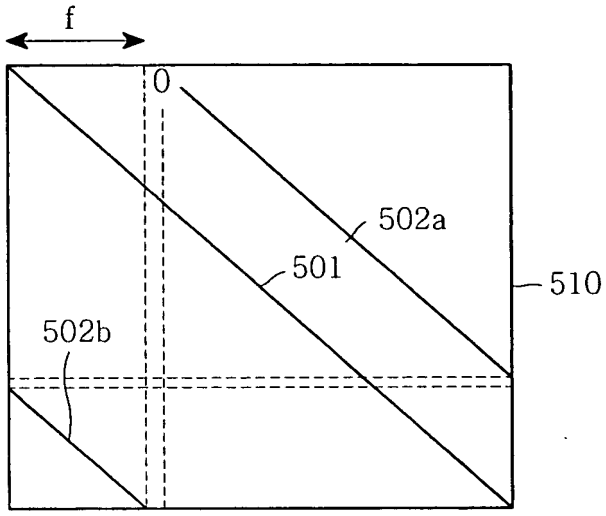


FIG.5

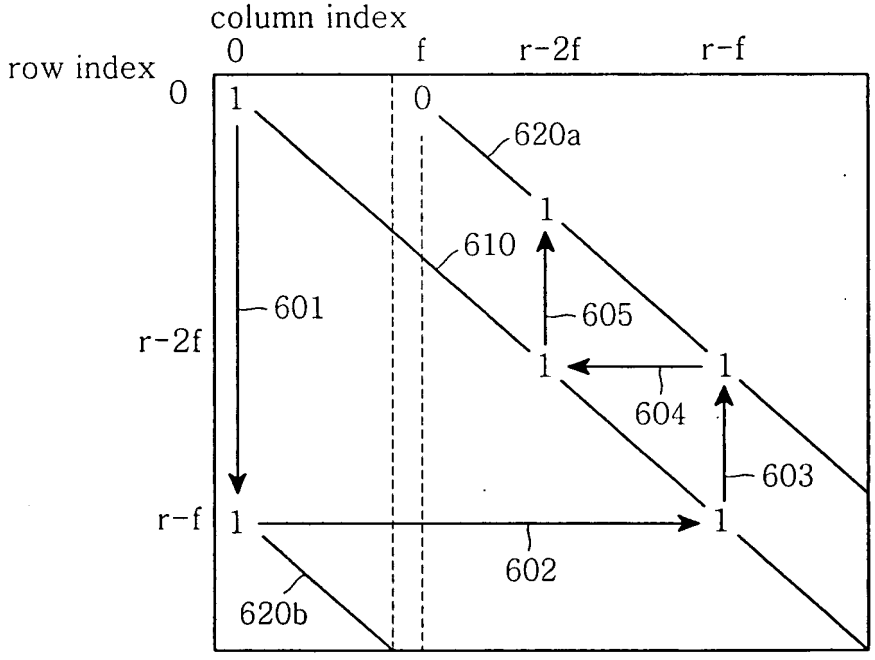


FIG.6

0	0	0	0			0				0									
0	1	2	3			6					11								
0	2	4	6			12					22								
0	3	6	9			18					33								
0	4	8	12				28						48						
0	5	10		20			35						60						
0	6	12		24			42						72						
0	7	14		28				56							2				
0	8	16		32				64							15				
0	9	18		36				72							28				
0	10	20			50				1							51			
0	11	22			55				10							65			
0	12	24			60				19							79			
0	13	26			65					41									
0	14	28			70					51									

Example of H_d with irregular distribution of $d_v = 15$ (p=89)

FIG.7

PCT/KR2004/002630
RO/KR 17.11.2004

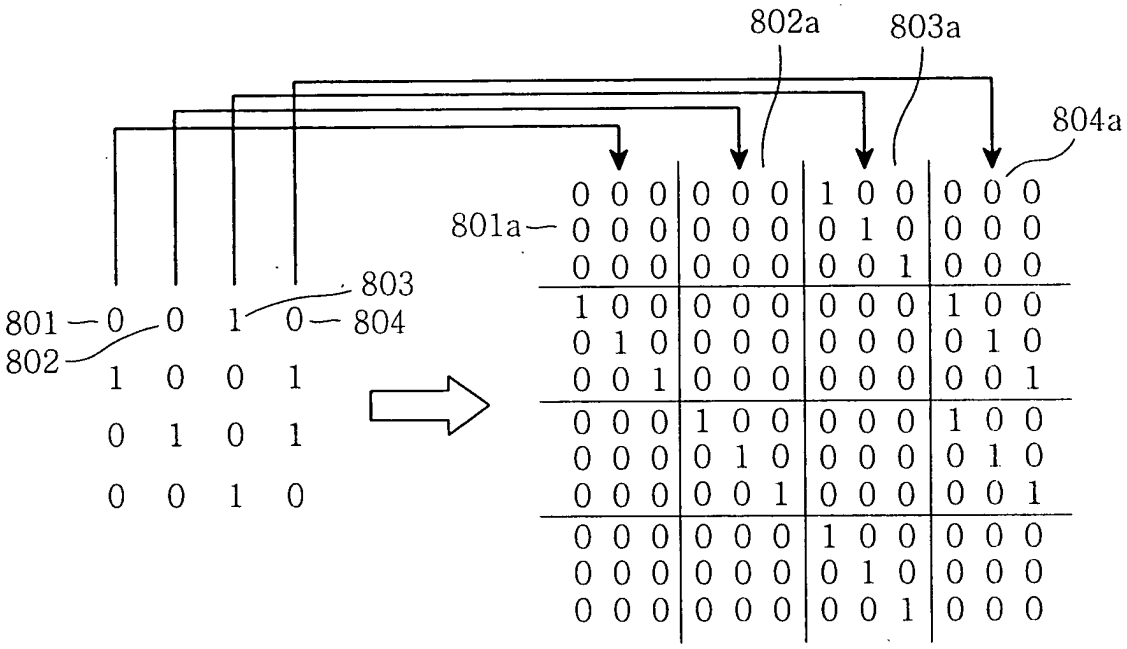


FIG.8

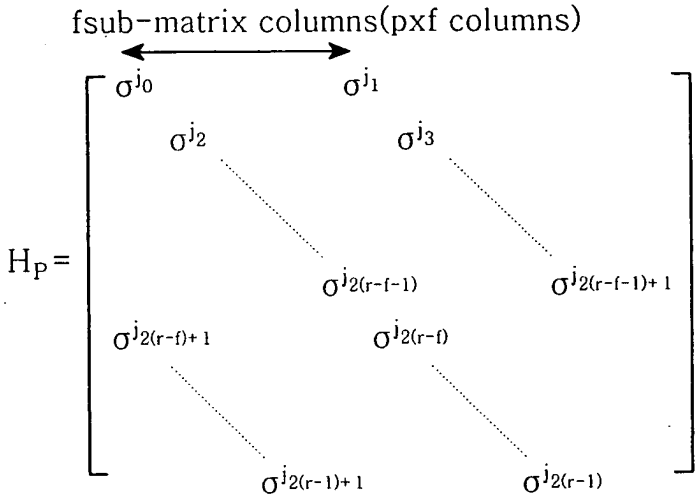

fsub-matrix columns(pxf columns)
$H_P =$
σ^{j_0}
σ^{j_1}
σ^{j_2}
σ^{j_3}
$\sigma^{j_{2(r-f-1)}}$
$\sigma^{j_{2(r-f-1)+1}}$
$\sigma^{j_{2(r-f)+1}}$
$\sigma^{j_{2(r-f)}}$
$\sigma^{j_{2(r-1)+1}}$
$\sigma^{j_{2(r-1)}}$

FIG.9

PCT/KR2004/002630
RO/KR 17.11.2004

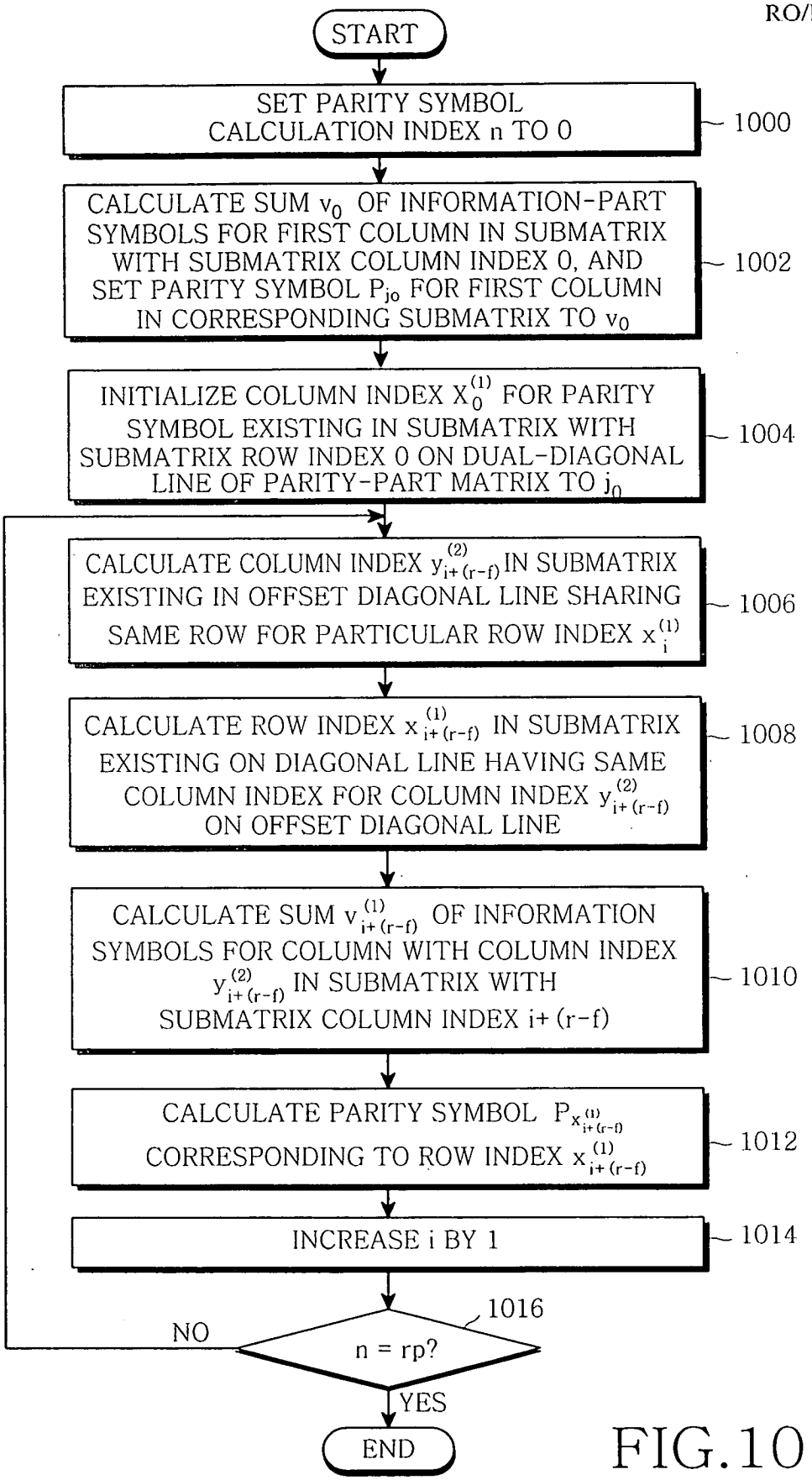
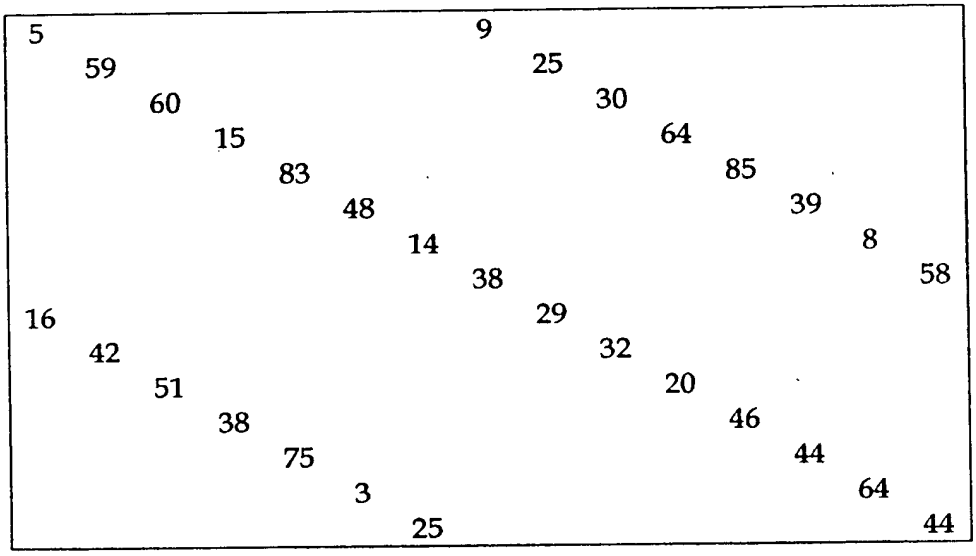


FIG.10



Example of H_p by lifting the generalized dual-diagonal matrix (r=15, f=7, p=89)

FIG.11

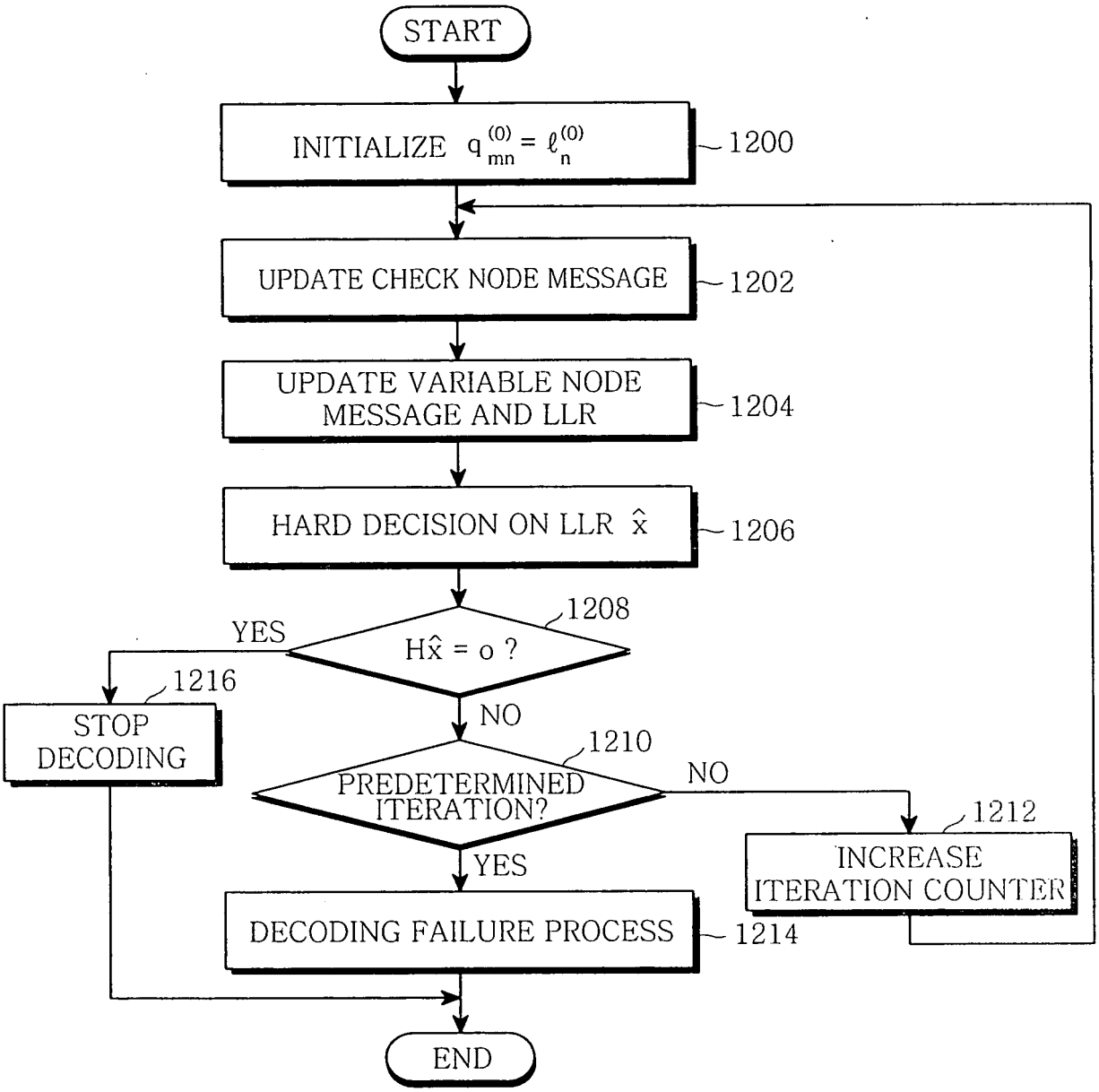

START
INITIALIZE $q_{mn}^{(0)} = \ell_n^{(0)}$
1200
UPDATE CHECK NODE MESSAGE
1202
UPDATE VARIABLE NODE MESSAGE AND LLR
1204
HARD DECISION ON LLR $\hat{x}$
1206
$H\hat{x} = o$?
1208
YES
NO
STOP DECODING
1216
PREDETERMINED ITERATION?
1210
NO
YES
INCREASE ITERATION COUNTER
1212
DECODING FAILURE PROCESS
1214
END

FIG.12

PCT/KR2004/002630
RO/KR 17.11.2004

- H_d

0	0	0	0				0					0											
0	1	2	3				6							11									
0	2	4	6				12							22									
0	3	6	9				18							4									
0	4	8	12					28								19							
0	5	10		20				6								2							
0	6	12		24				13								14							
0	7	14		28					27									4					
0	8	16		3					6									17					
0	9	18		7					14									1					
0	10	20			21						3											24	
0	11	22			26						12											9	
0	12	24			2						21											23	
0	13	26			7							14											
0	14	28			12							24											

FIG.13A

PCT/KR2004/002630
RO/KR 17.11.2004

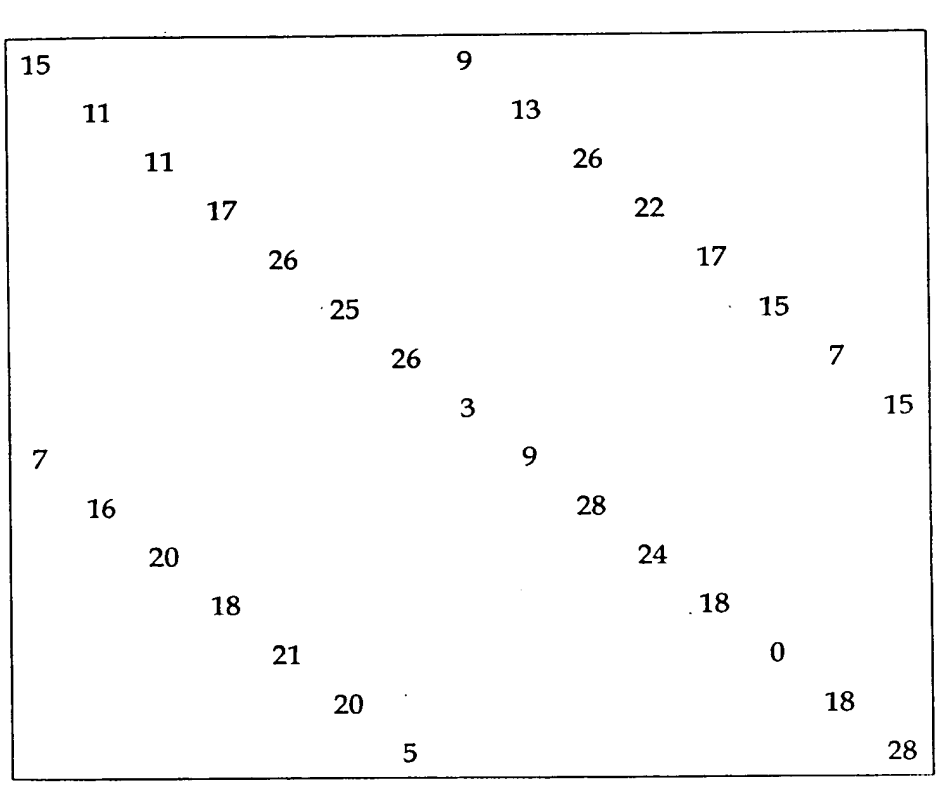


FIG.13B

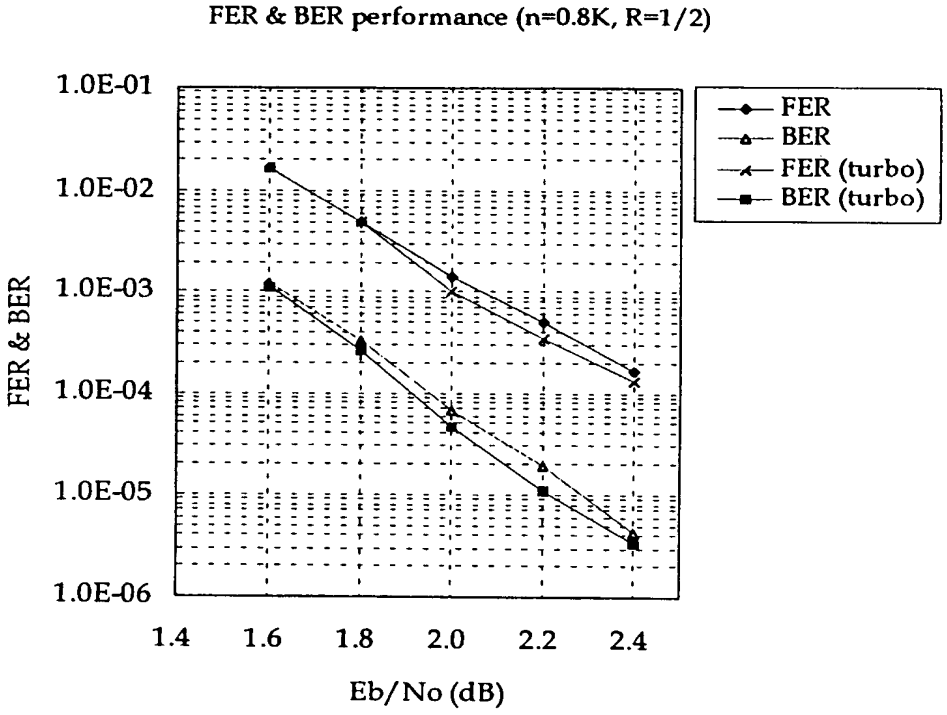

FER & BER performance (n=0.8K, R=1/2)
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
FER & BER
1.4
1.6
1.8
2.0
2.2
2.4
Eb/No (dB)
FER
BER
FER (turbo)
BER (turbo)

FIG.13C

PCT/KR2004/002630
RO/KR 17.11.2004

- H_d

0	0	0	0				0						0										
0	1	2	3				6								11								
0	2	4	6				12								22								
0	3	6	9				18								33								
0	4	8	12						28									48					
0	5	10			20				35									7					
0	6	12			24				42									19					
0	7	14			28						3										38		
0	8	16			32						11										51		
0	9	18			36						19										11		
0	10	20					50						37										34
0	11	22					2						46										48
0	12	24					7						2										9
0	13	26					12								24								
0	14	28					17								34								

FIG.14A

PCT/KR2004/002630
RO/KR 17.11.2004

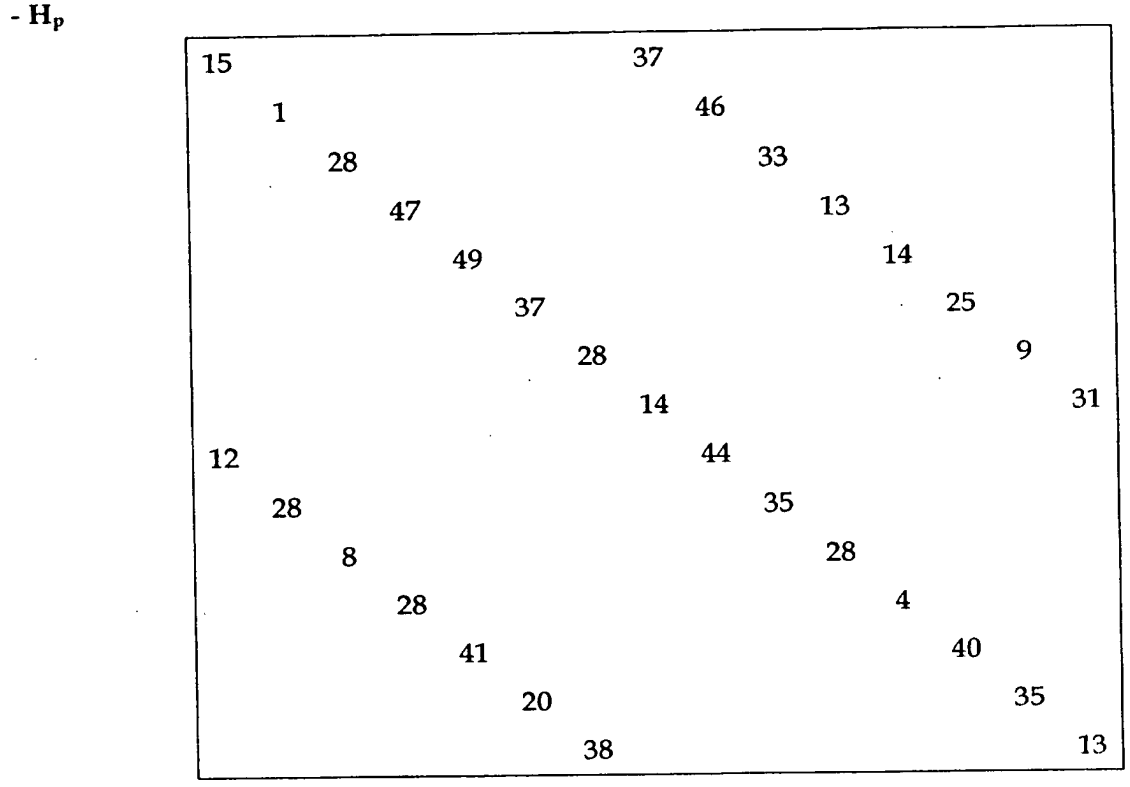


FIG.14B

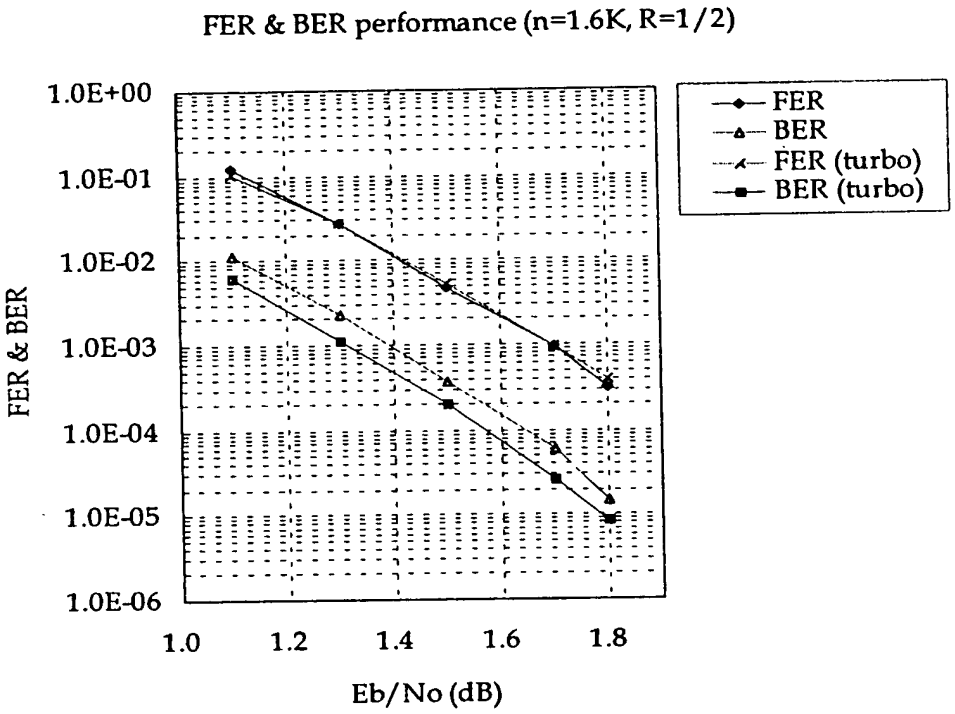

FER & BER performance (n=1.6K, R=1/2)
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
FER & BER
1.0
1.2
1.4
1.6
1.8
Eb/No (dB)
FER
BER
FER (turbo)
BER (turbo)

FIG.14C

PCT/KR2004/002630
RO/KR 17.11.2004

- H_d

0	0	0	0			0				0					
0	1	2	3			6					11				
0	2	4	6			12					22				
0	3	6	9			18					33				
0	4	8	12				28					48			
0	5	10		20			35					60			
0	6	12		24			42					72			
0	7	14		28				56					91		
0	8	16		32				64					1		
0	9	18		36				72					14		
0	10	20			50				90						37
0	11	22			55				99						51
0	12	24			60				5						65
0	13	26			65					27					
0	14	28			70					37					

FIG.15A

PCT/KR2004/002630
RO/KR 17.11.2004

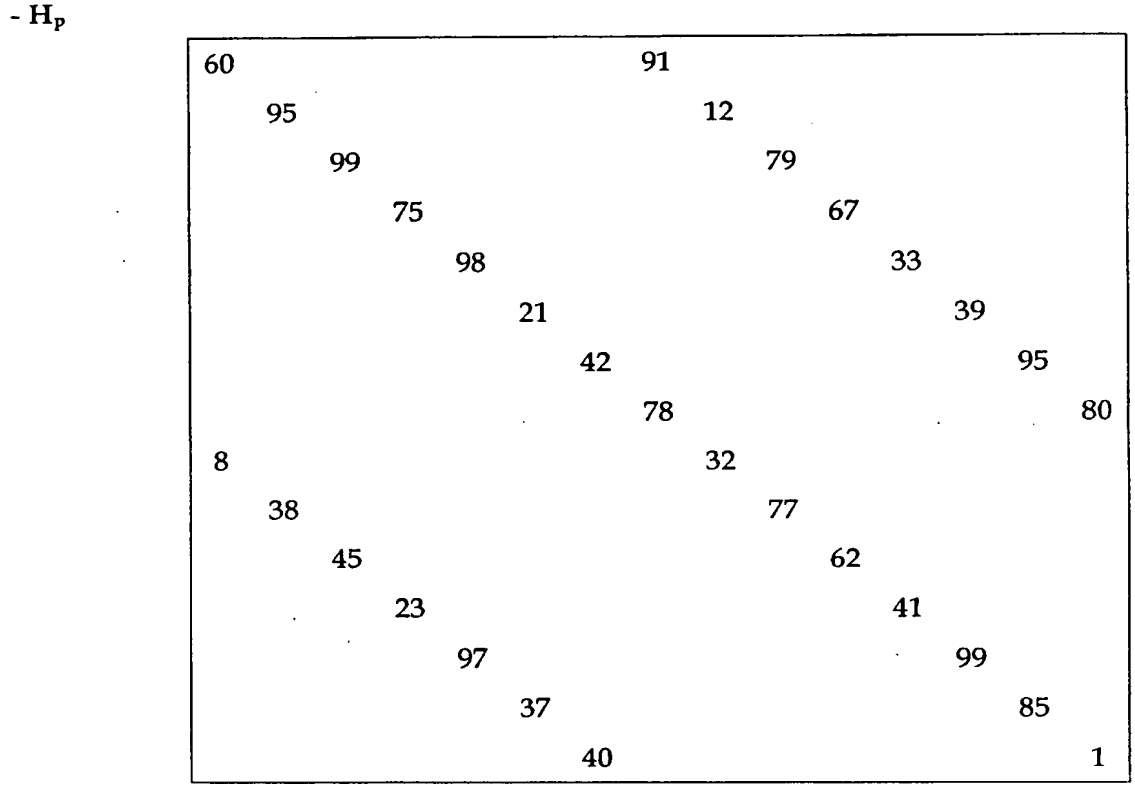


FIG.15B

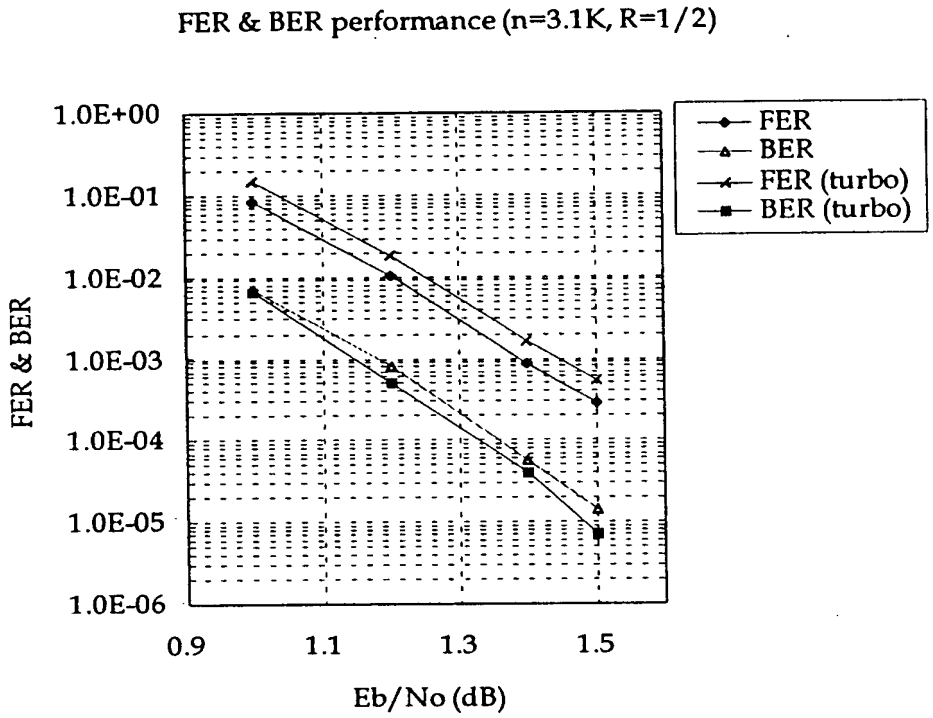

FER & BER performance (n=3.1K, R=1/2)
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
FER & BER
0.9
1.1
1.3
1.5
Eb/No (dB)
FER
BER
FER (turbo)
BER (turbo)

FIG.15C

PCT/KR2004/002630
RO/KR 17.11.2004

- H_d

0	0	0	0		0			0						
0	1	2	3		6				11					
0	2	4	6		12				22					
0	3	6	9		18				33					
0	4	8	12			28				48				
0	5	10		20		35				60				
0	6	12		24		42				72				
0	7	14		28			56				91			
0	8	16		32			64				104			
0	9	18		36			72				117			
0	10	20			50			90				140		
0	11	22			55			99				154		
0	12	24			60			108				168		
0	13	26			65				130					
0	14	28			70				140					

FIG.16A

PCT/KR2004/002630
RO/KR 17.11.2004

0	0	0	0			0				0									
0	1	2	3			6					11								
0	2	4	6			12					22								
0	3	6	9			18					33								
0	4	8	12				28						48						
0	5	10		20			35						60						
0	6	12		24			42						72						
0	7	14		28				56							2				
0	8	16		32				64							15				
0	9	18		36				72							28				
0	10	20			50				1								51		
0	11	22			55				10								65		
0	12	24			60				19								79		
0	13	26			65					41									
0	14	28			70					51									

Example of H_d with irregular distribution of d_v = 15 (p=89)

FIG.16B

PCT/KR2004/002630
RO/KR 17.11.2004

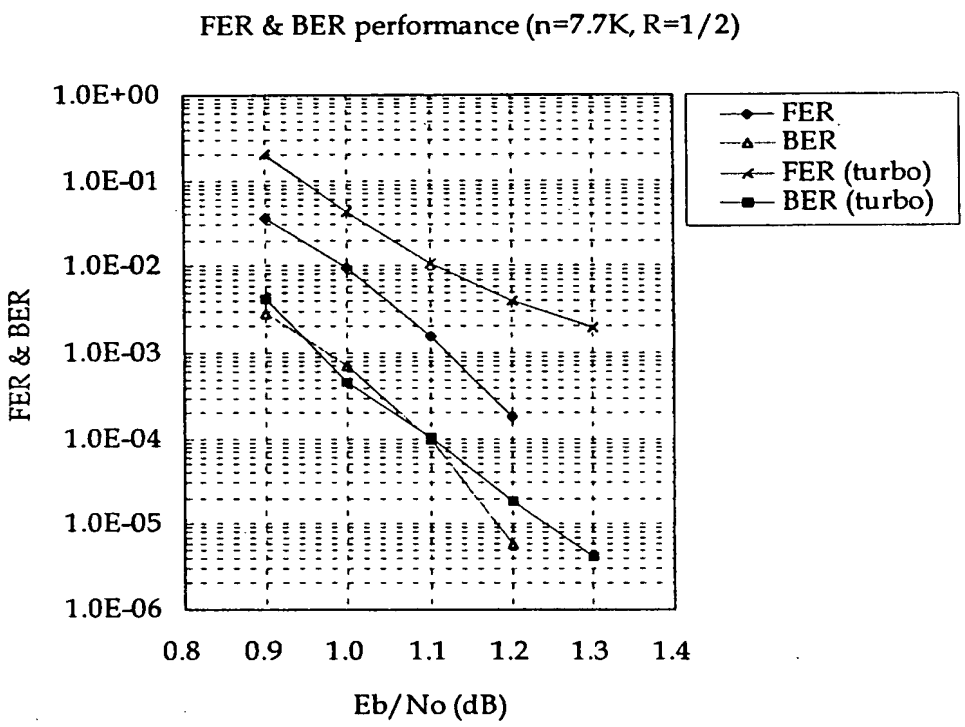


FIG.16C

PCT/KR2004/002630
RO/KR 17.11.2004

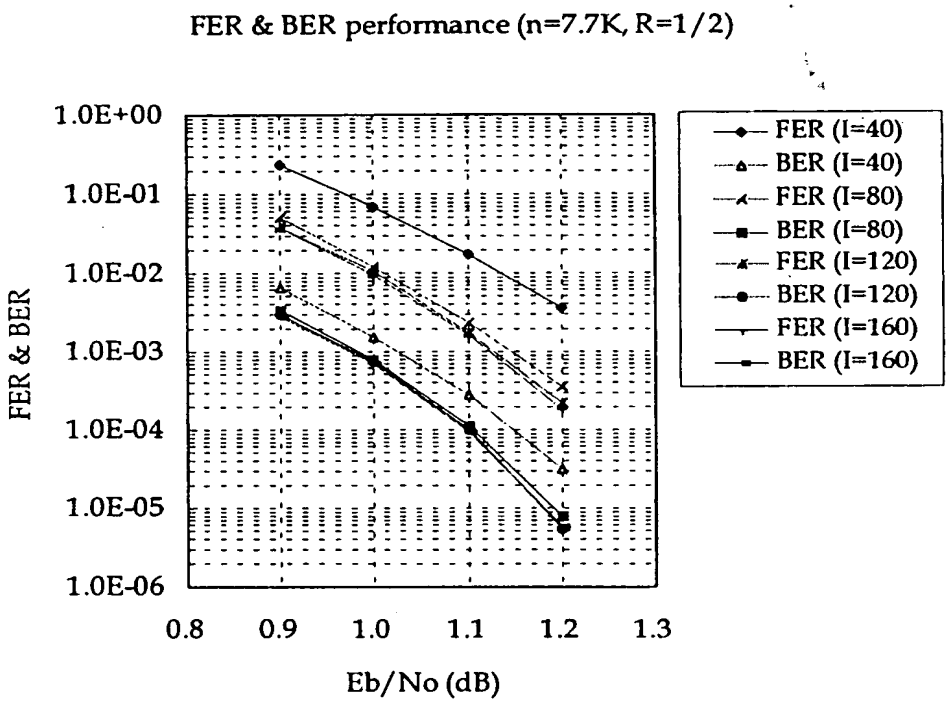


FIG.16D